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WORK FOR ARCTIC EXPLORERS.

The scientific work, laid out for the arctic exploring expedition which lately sailed from England, probably excelled in scope and variety that of any preceding expedition as remarkably as its material outfit did. The instructions for the guidance of the observers were prepared by the most eminent Englishmen in the several departments of research, and are minute and comprehensive enough to keep the explorers from idleness, whatever else may befall them.

Popularly the grand object of the expedition is to reach the pole; practically that is one of the least important of the many purposes of the voyage. And a couple of years spent in arctic regions can scarcely fail to be fruitful scientifically, even if the pole still remains unwon. There is much to be learned of the natural history of those frigid regions, and many physical phenomena await solution there. Chief of the latter may be regarded the magnetic condition of that portion of our globe.

Accustomed to the near coincidence of compass north with astronomical north in this part of the world, it is all but impossible for us to form any adequate conception of the magnetic confusion that the explorer has to deal with in arctic regions, when compass north is no longer toward the pole but toward an area west of Baffin's Bay, in north latitude 70°.—the magnetic pole. This point will lie to the astronomical southwest of the expedition when it reaches Smith's Sound, where the Alert hopes to go into winter quarters; in other words, astronomical southwest will there be identical with compass north, and the north pole will lie to the southeast by compass.

As a guide to the expedition, three provisional maps have been constructed, showing, for the whole unexplored area, the magnetic condition which may be expected if the distribution of terrestrial magnetism be such as our present knowledge indicates. The most important of these maps of the magnetic elements shows the assumed lines of compass direction over the whole circumpolar area, and the region of Greenland, Baffin's Bay, and Davis' Strait, and also, approximately, the lines of equal declination between the north pole of the earth and the northern magnetic pole over the same areas. The importance of such information to the explorers is shown by the following example:

Suppose the expedition to have arrived at the parallel of

85° in longitude 60° W. of Greenwich, at which point the pole will be due east by compass. They start in an astronomically easterly direction for a sledge journey along the parallel of 85°. In longitude 20° W. of Greenwich the north pole will bear northeast. When longitude 40° E. of Greenwich is reached, the astronomical and magnetic meridian will correspond; the north pole will lie between the explorers and the magnetic pole, and the compass will therefore point to the true north. In longitude 180° the pole will bear due west; and in longitude 112° W. of Greenwich, the explorers will have arrived between the north pole and the magnetic pole, and consequently the north pole will bear due south.

Should the expedition be so lucky as to reach the pole, all the points of the compass will be south; latitude and longitude will vanish; the north star will lie directly overhead, and all the other stars will revolve around it, neither rising nor setting. The moon will remain for days above the horizon, and the sun, in summer time, will make an unbroken circuit of the heavens, yet always in the south. Time in its ordinary sense will cease; morning, noon, and night will be one; the dial of the heavens will be a blank.

The astronomical instructions prepared by Mr. Hind, superintendent of the "Nautical Almanac," give data for two eclipses of the sun in the polar area in 1876 and 1877; also a list of occultations of stars by the moon visible in or near the probable winter quarters of the expedition, 82° N. latitude and 60° W. longitude, between September 1875 and March 1877, which will enable the observers to employ the best means of determining their longitude.

Special arrangements have been made for the spectroscopic study of the aurora, the instructions for which were prepared by Professor Stokes.

Professor Tyndall furnishes hints for the observation of glacial phenomena; the rapidity of the conduction of heat through ice; the rate at which the ends of glaciers advance into the sea; whether icebergs are formed by the buoyancy of the masses of ice thrust under the water, or by the weight of overhanging ice cliffs whose bases have been worn away by the waves; what kinds of matter are brought down from the interior by glaciers and transported by icebergs; the condition of rocks and hills along the sides of glaciers; the color of the ice and its veining at the ends of glaciers; also the color of the sky, the presence or absence of germs in the air, the range of sounds, and so on.

The solution of many weather problems will be looked for through continuous meteorological observations, especially with regard to storms which pass over the extreme northern part of Europe, many of them being connected with areas of barometrical depression which follow tracts lying within the arctic circle.

Especial attention will also be given to tidal phenomena, particularly of the tidal wave which sets southerly through the northern part of Smith's Sound, and indicates an open passage along the northern coast of Greenland. Pendulum observations will also be made, with a view to obtaining data toward the determination of the earth's figure in high northern latitudes.

The natural history of the region explored will be attended to with equal care. The instructions for biological and botanical observations were furnished by Professor Huxley and Dr. Hooker. The latter particularly refers to the deficiency of our knowledge respecting the hybridizing of certain of the species of arctic plants, especially those of *draba*, *saxifraga*, and *salix*. He suggests also that the pollen of the various species should be carefully examined, and observations made as to whether it is carried by wind or by insects, and gives minute directions for observations touching the power of seeds to resist cold without loss of life. In this connection it may be remarked that not more than 762 species of flowering plants have been found in arctic regions, the number belonging exclusively thereto being about fifty. Arctic Greenland furnishes 207 species, of which 195 are Scandinavian types, while only 12 are American and Asiatic types. Botanically, therefore, Greenland is much nearer to Europe than to America. Among the four plants collected by Dr. Bessell, of the *Polaris*, in latitude 82° N.—the extreme northern limit of phanerogamic vegetation, so far as known—was a near relative of our familiar dandelion.

With microscopic plants and animals the arctic seas are abundantly furnished, and Professor Huxley directs especial attention to them in connection with the composition of the sea bottom for the testing of certain modern palæontological theories. Instructions for the collection and preservation of such low forms of life were furnished by Dr. Allman, who also directs attention to the phosphorescence of the sea, as far as it is due to living organisms.

The explorers are also furnished with descriptive lists of the mammalia which may be seen, with directions for observation and the preservation of specimens; also with instructions with reference to the collection of geological and mineralogical specimens, meteorites, meteoric dust, and other matters of interest.

INSTABILITY OF THE EARTH'S SURFACE.

We are so accustomed to consider the solid earth to be the type of perfect stability that it requires quite an effort of the mind to elevate itself to the thought that even the rocks, which appear to be the foundation on which everything else rests, are of an unstable nature, subject to upheavals, depressions, and dislocations. Every observing mind that has seen bold mountain regions, railroad cuttings, or mining shafts must have been struck with the evidences of mighty disturbances, although perhaps a book on geology never came under his eye. It is the study of these disturbances which has created this science, one of the most interesting in the whole field of human knowledge.

It was formerly supposed that the only cause of such changes was volcanic action, and that all the metamorphoses which have taken place were sudden and violent. The observations of volcanic action and of the changes which it rapidly produces in the earth's surface necessarily led to such conclusions; but patient investigation, during long periods of time, has led to the knowledge of a mode of change, formerly unsuspected, by slow upheavals and depressions, taking place gradually, at a rate of one or more feet in a century. Such changes have been and are now constantly taking place, and necessarily must, if prolonged for a sufficiently long period of time, essentially change the earth's surface, not only as to the relative heights of continents and islands, but, in connection with the ocean, as to the whole cosmography of our globe.

We will not speak of the supposed continent Atlantis, mentioned by the ancient mythological writers, which was, they asserted, sunken in the Atlantic ocean; but we will only mention positive facts, recorded as a result of careful observation. That the coasts and bottom of the Baltic sea are rising is an old and well established fact, the ancient shores being several thousand feet from the present water's edge; while Great Britain and part of the west coast of Europe, Holland, Belgium, and France are in a sinking condition. The evidences in and around the British Channel have long since proved the probability of this, while the Astronomer Royal has announced that minute observations prove that Greenwich Observatory, with the ground upon which it stands, has been sinking ever since its establishment.

In regard to our continent, it has been proved that the whole Pacific coast, especially California, with all its mountains, is perpetually rising, and that at a comparatively rapid rate. The land containing in its bosom our great American Lakes is slowly sinking; while southern Indiana, Kentucky, and the surrounding States are rising. Geological investigations prove that our great lakes, except Ontario, had formerly a southern outlet; until, by gradual northern depressions and southern upheavals, a northern outlet was formed from Lake Erie into Ontario, about 40,000 years ago. This outlet, the Niagara river, is still wearing away its channel. The division line, of the watershed south of the lakes and the Mississippi valley, has since that time been steadily traveling southward; and when Chicago recently turned the waters of Lake Michigan, through the Chicago river, into the Mississippi valley, the old state of affairs was artificially re-established.

New Jersey is sinking, with New York city and Long Island, at the estimated rate of about 16 inches per century. The coast of Texas is ascending at a comparatively very rapid rate, some observers stating that it is as much as 30 or 40 feet in the last half century.

Combining these observations with the results of the recent deep soundings of the United States steamer *Tuscarora* in the Pacific Ocean, we find that the bed is evidently a sunken continent, abounding in volcanic mountains some 12,000 feet high, many of them not reaching the surface of the ocean, and others which do so forming the numberless islands of the Pacific. The study of the coral rocks proves that this sinking has continually been taking place during several centuries, and observations of the coast will undoubtedly reveal the fact that it has not yet ceased.

The most eminent German geologists and ethnologists now maintain that the locality of man's primitive origin, the seat of the so-called Paradise, was in the Pacific Ocean south of Asia, whence the race slowly diffused itself northward to Asia, westward to Africa, and eastward to Australia. When the great Pacific continent slowly sank, so that the ocean commenced filling the valleys, man retreated to the mountains, which, by continued sinking, were transformed into islands, and now form the many groups of Polynesia. The insularity of the thus preserved races was not productive of civilization, which requires conflict, in which the superiors in the end gain the victory over the inferiors. In those islands, the inferior races were preserved for want of this conflict, hence their savage condition even at the present day; while primitively the greatest advance took place at the spot of the most intense conflict, the continent of Southern Asia. Even at the present day, it has been said that gunpowder is the greatest civilizer.

THE COLORADO POTATO BUG.

The farmers in our vicinity are just now having their potato fields invaded by the celebrated Colorado bug, and the demand for Paris green has become so great throughout the country that, were it not an article obtainable in almost unlimited quantities, the price would be greatly enhanced.

Let every user of the article keep constantly in mind that Paris green is a deadly poison, and great care should be taken in the handling of it. Hands from which the skin is abraded, or on which any sore exists, should be protected with gloves, and all precautions should be used against inhaling the poison while mixing it.

The following, from the *Maryland Farmer*, seems to be a practical mode of applying the poison to the vines. We would, however, suggest, that, on small patches, the dipping of a broom in the liquid and shaking it over the vines be used as a substitute for the appliance which our contemporary suggests:

THE COLORADO BEETLE—THE BEST EXTERMINATOR.

Sweeten a barrel of water with 1 gallon of cheap molasses; then add and well incorporate 1 lb. good Paris green, and apply the same in one application to 1 acre of potatoes. The best mode of applying the liquid to the potato vines is in the use of a can that will contain 4 or 5 gallons, which may be lashed on the back of a man, who may apply the liquid, very